

Monthly Maps of SMAP L2 Version 4 Soil Moisture Retrievals over Contiguous United States in 2016: Data Sample Size Under Various Quality Flags

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This document presents the data sample size of the SMAP L2 Version 4 soil moisture retrievals for each month during 2016 and the percentages of the soil moisture data within some quality control limits defined by NASA. The soil moisture retrievals of each 36-km grid cell are associated by NASA to a surface condition and retrieval quality flag. Each half orbit was obtained from <https://nsidc.org/data/SPL2SMP/versions/4>. There are 11 surface conditions defined in the SMAP data: static water, radar-derived water, coastal proximity, urban area, precipitation, snow, permanent ice, frozen ground from SMAP radiometer-derived freeze/thaw state, frozen ground from GMAO TSURF model, mountainous terrain, and dense vegetation. For each surface condition, a lower threshold T1 and a higher threshold T2 are defined. Only data with all surface conditions under the T1 threshold are flagged as high quality. In this document, we use three variables (i.e., `soil_moisture`, `surface_flag`, and `retrieval_qual_flag`) from each data file to illustrate the distribution and quality of the data.

Figures 1 to 12 show the sample size of soil moisture retrievals and the percentages of the samples falling into three categories, including less than T1, between T1 and T2, and larger than T2. Several features can be found in the figures. First, as is evident, the distribution of the retrievals is strongly affected by seasonality. Generally, the retrieval is skipped over areas with snow cover. Second, in the majority of the eastern United States and the West Coast, the retrievals are mostly flagged with a surface condition larger than the T2 threshold, indicating a not recommended quality. These flags are mainly attributed to dense vegetation. Third, the data show that over the western mountain areas, there are samples flagged with a surface condition falling between T1 and T2. These flags mostly occur in the ascending overpasses, and we suspect that these flags are attributed to the satellite scanning angle and the mountain aspects. More investigation is needed as data does not reveal what surface conditions are associated with these flags over the mountain areas in the ascending orbits.

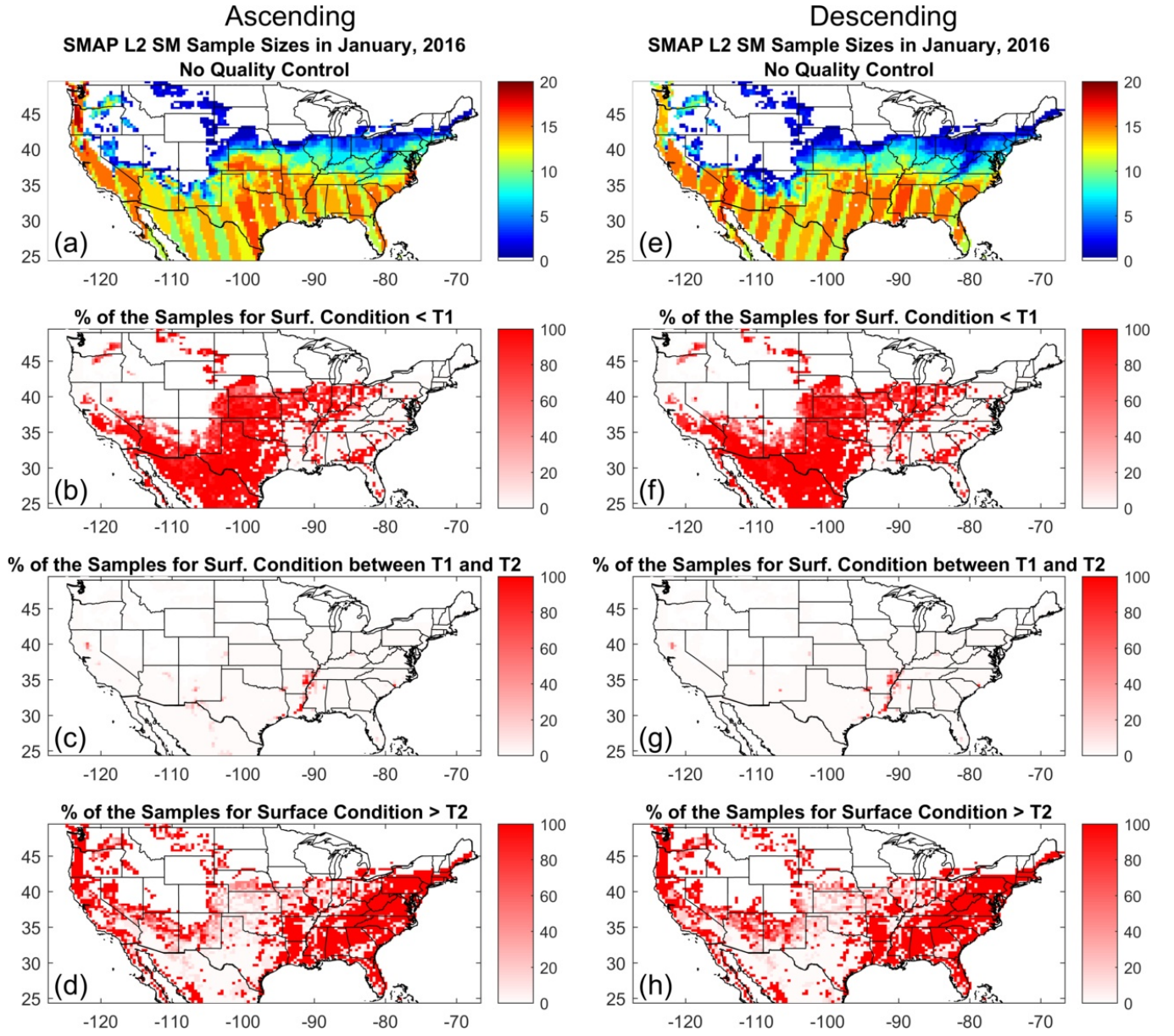


Figure 1: The sample size in January 2016 and the percentages of data falling into three categories (i.e., a surface condition found to be less than T1, between T1 and T2, and larger than T2). Ascending and descending data are shown in the left and right columns, respectively.

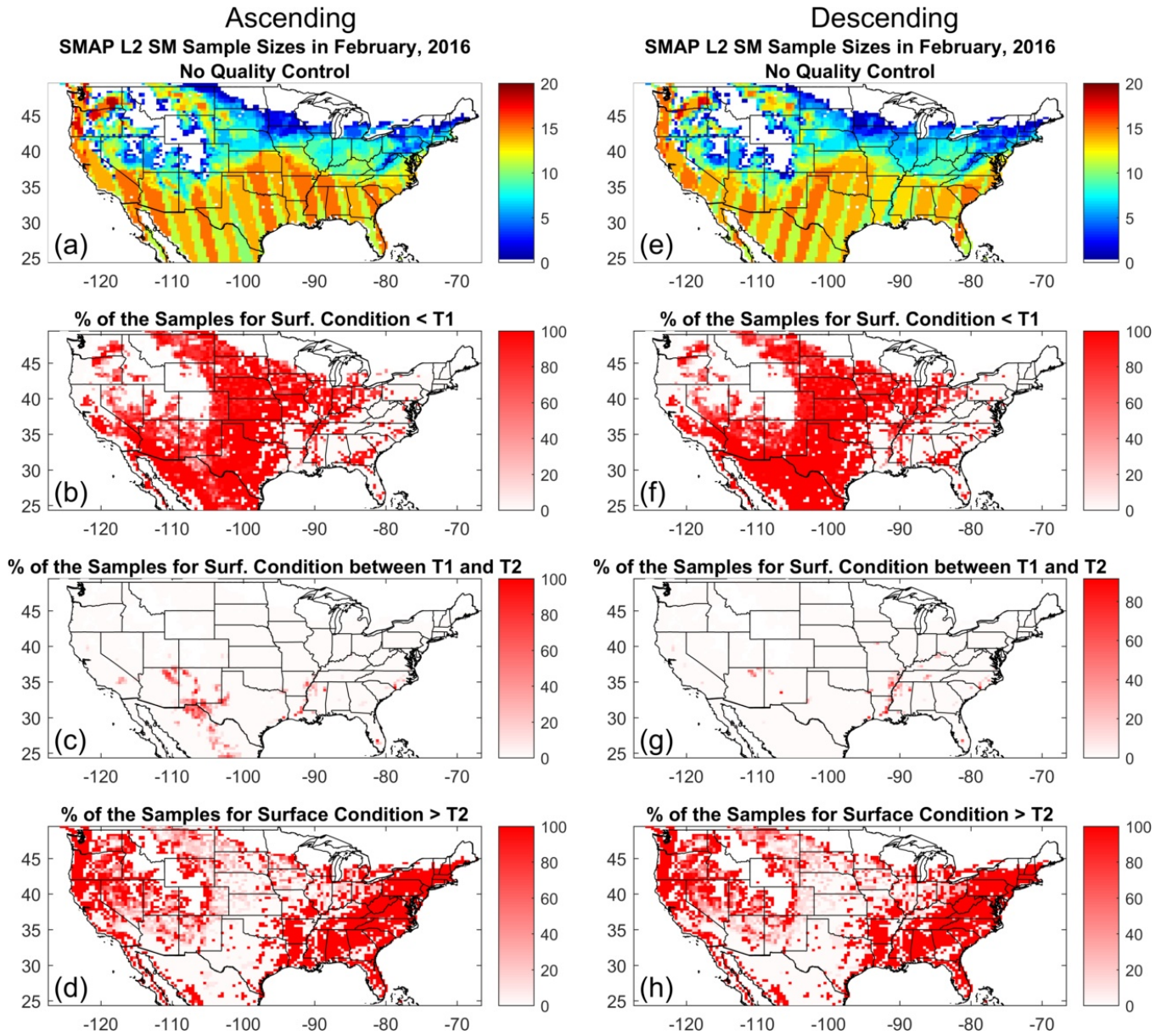


Figure 2: Same as Figure 1, except in February 2016.

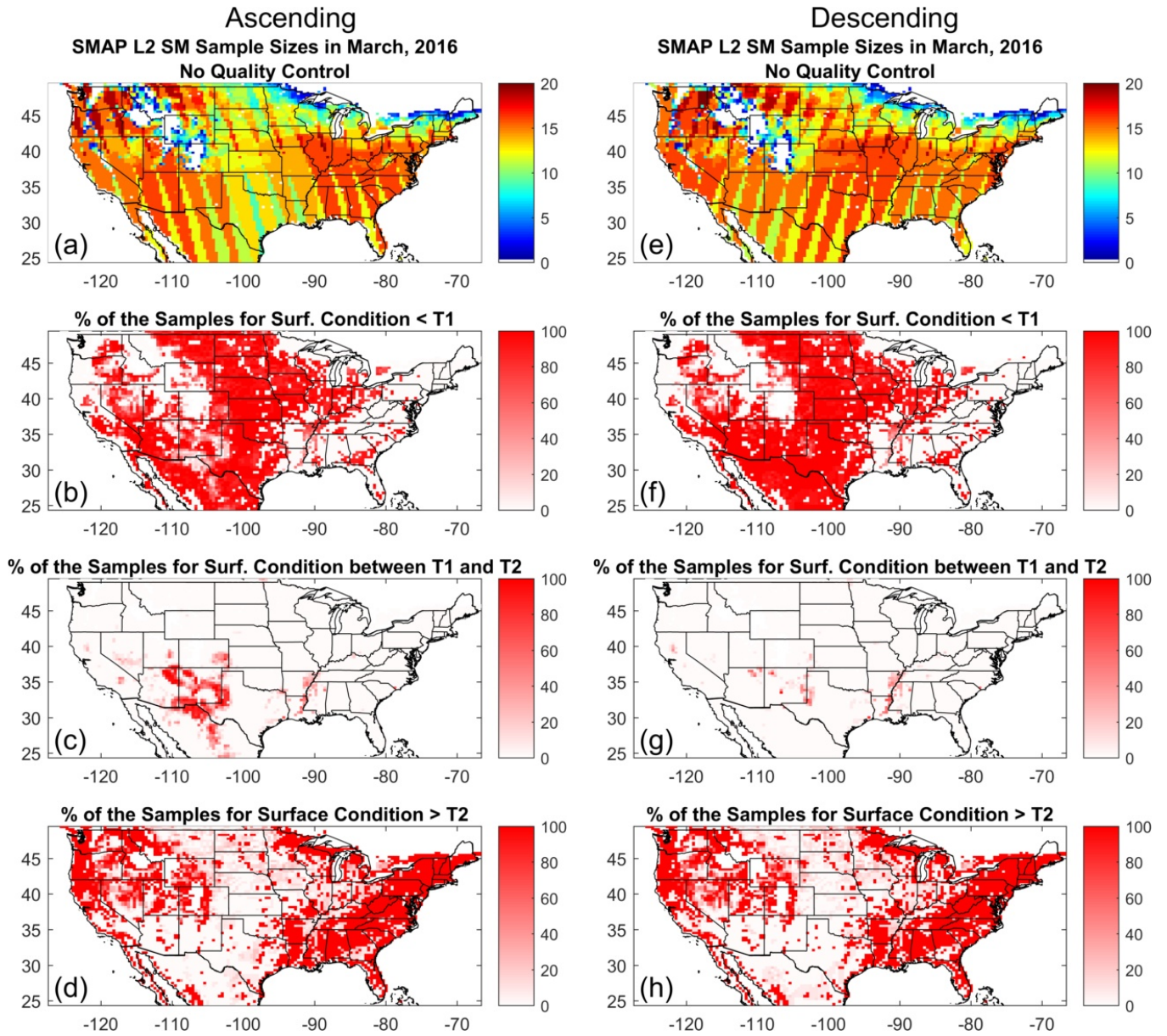


Figure 3: Same as Figure 1, except in March 2016.

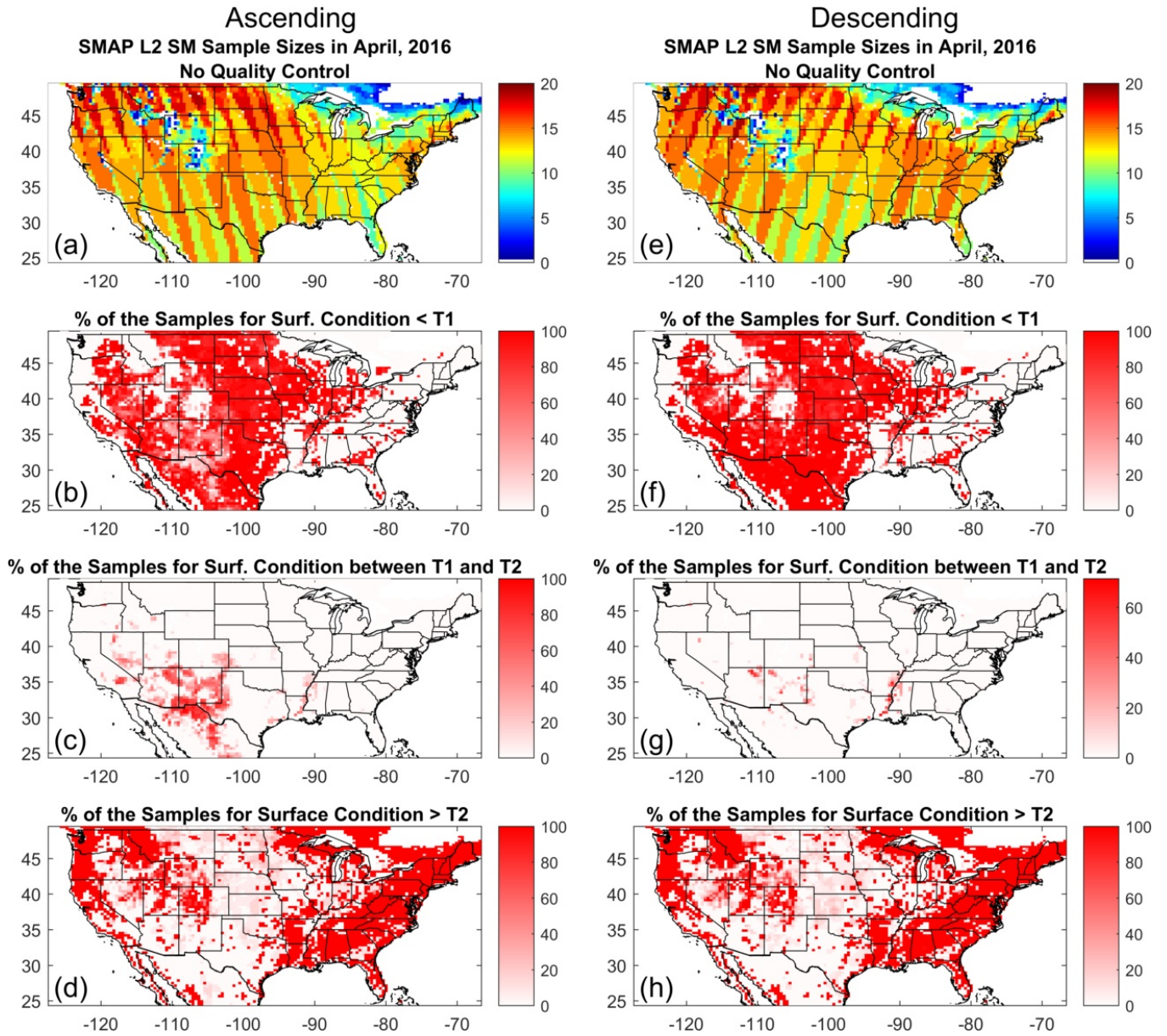


Figure 4: Same as Figure 1, except in April 2016.

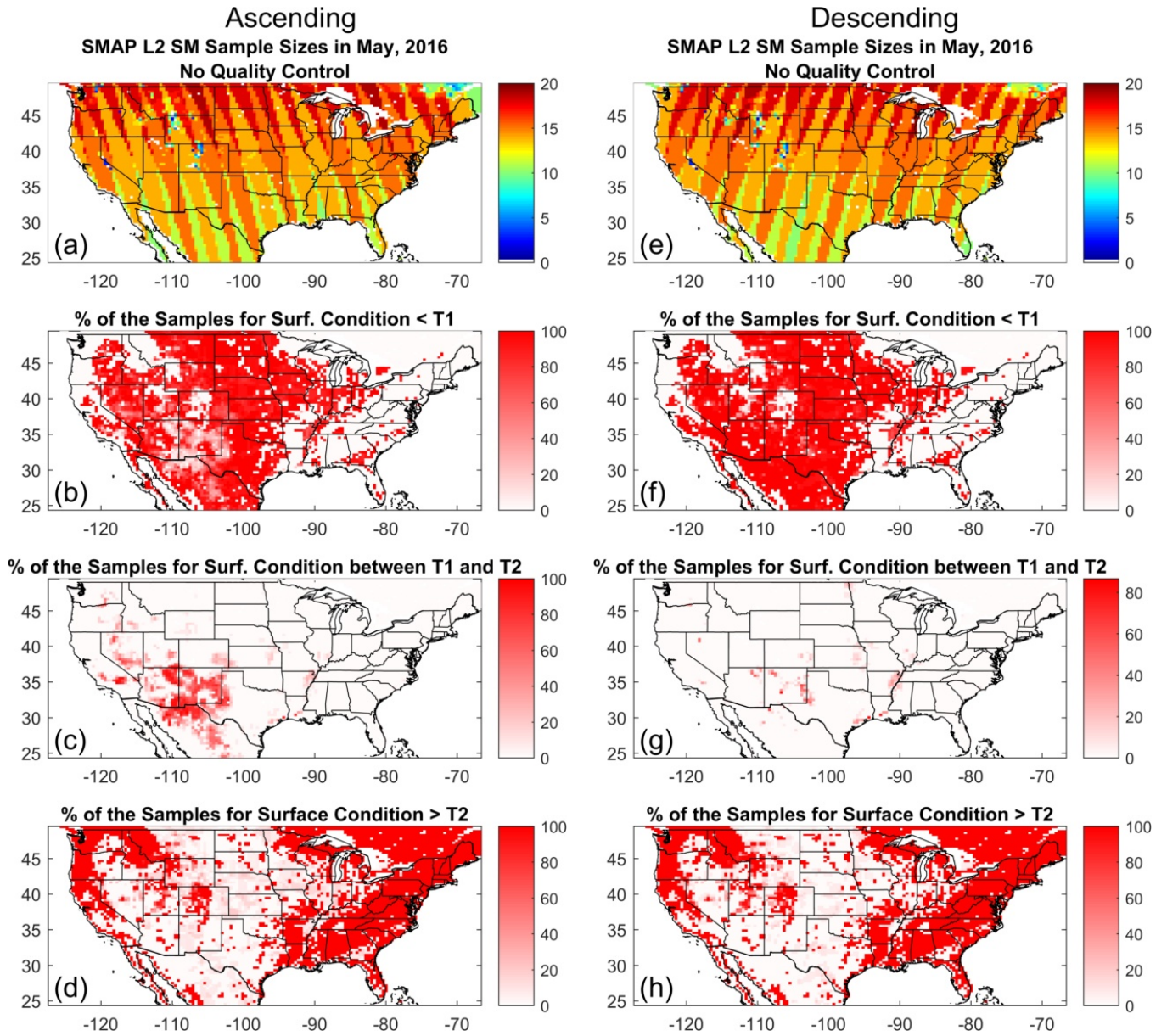


Figure 5: Same as Figure 1, except in May 2016.

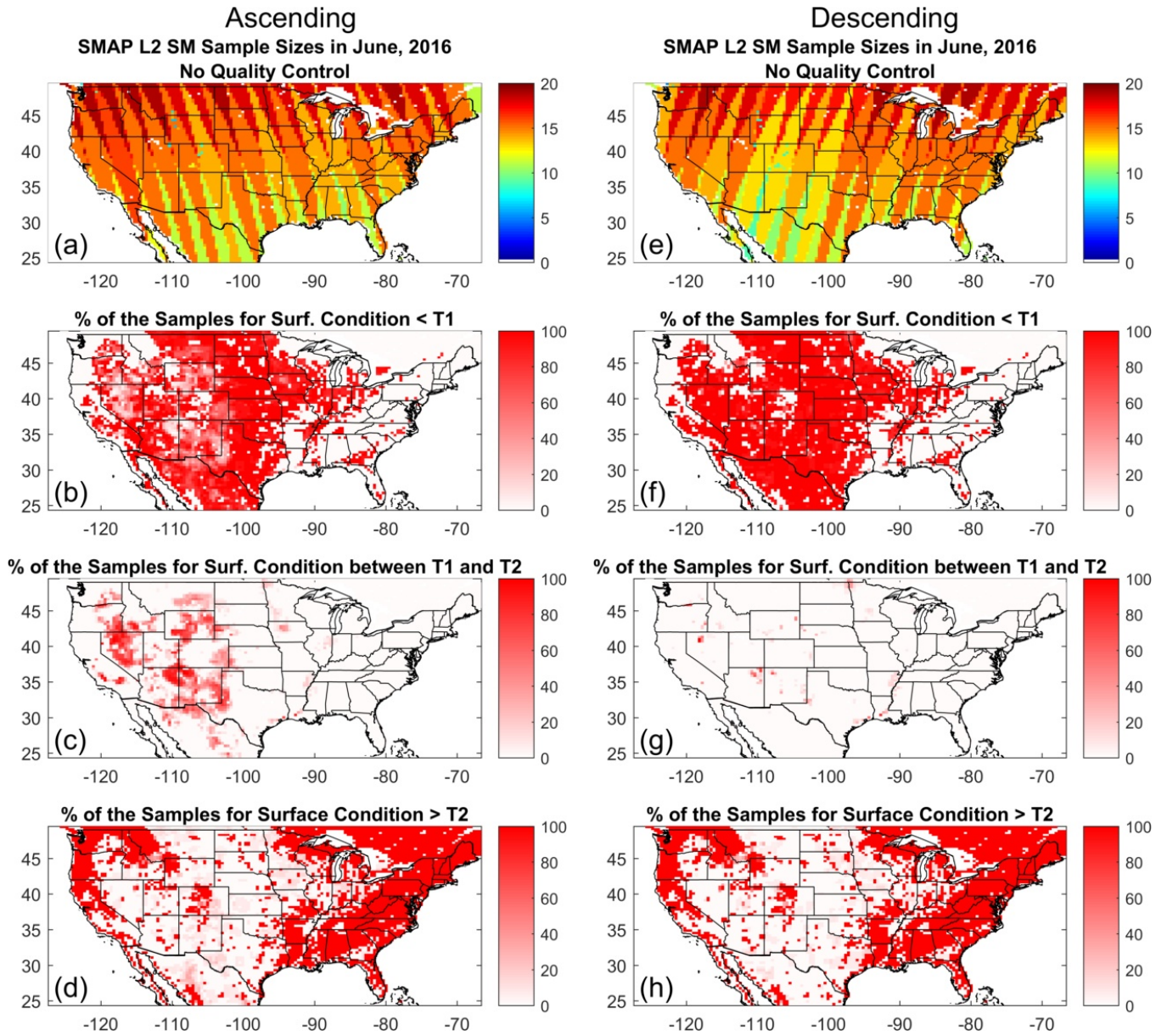


Figure 6: Same as Figure 1, except in June 2016.

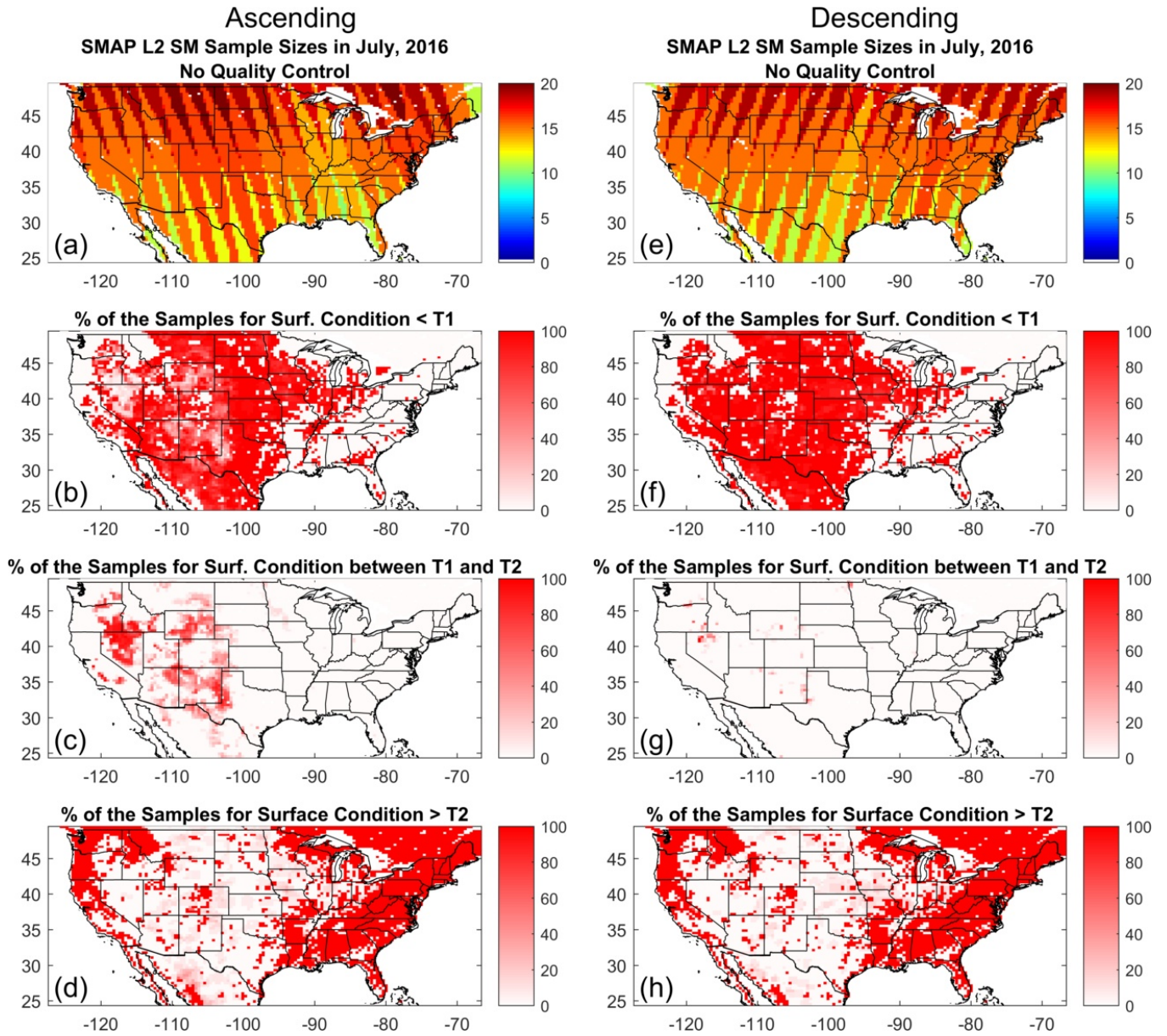


Figure 7: Same as Figure 1, except in July 2016.

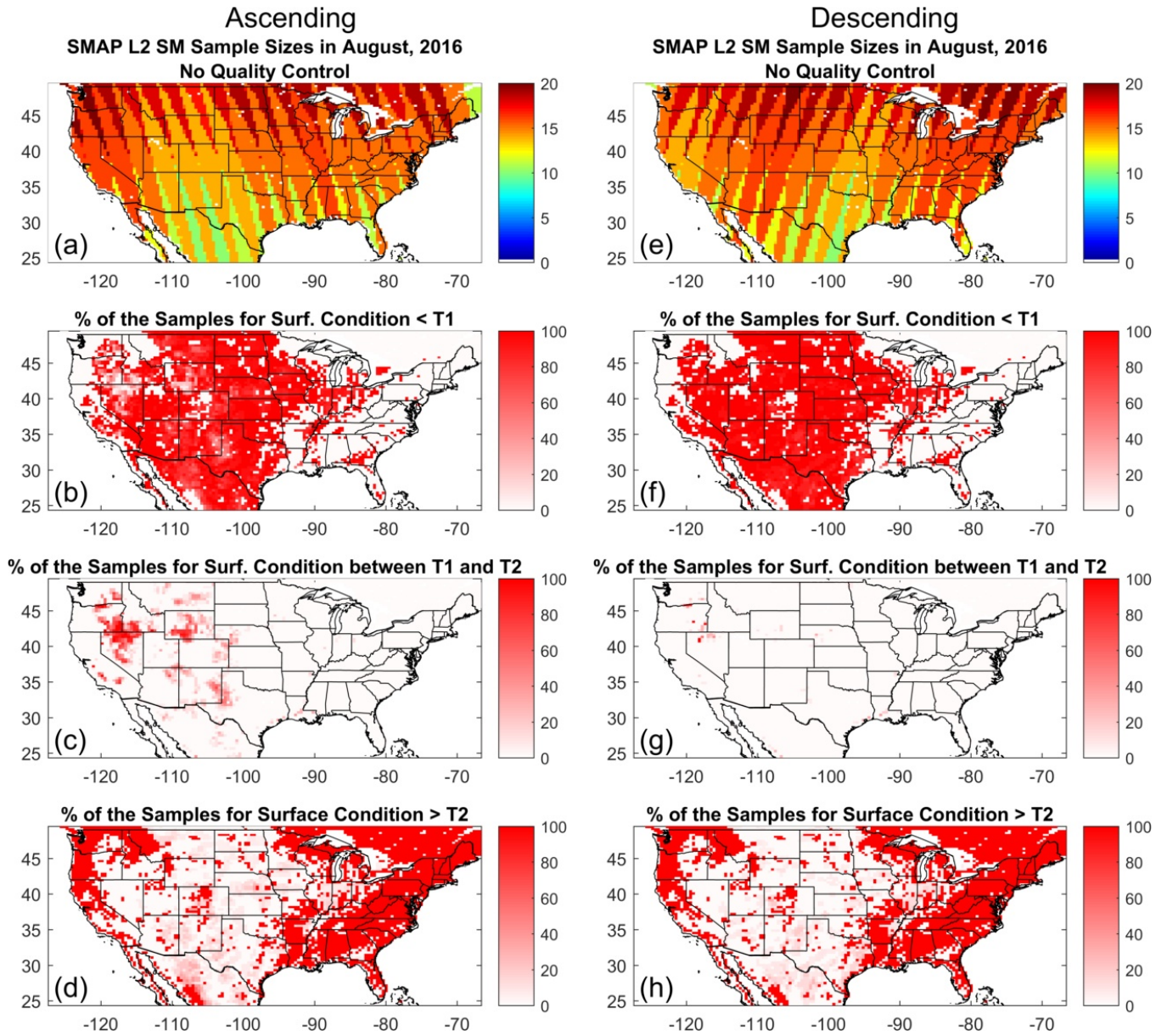


Figure 8: Same as Figure 1, except in August 2016.

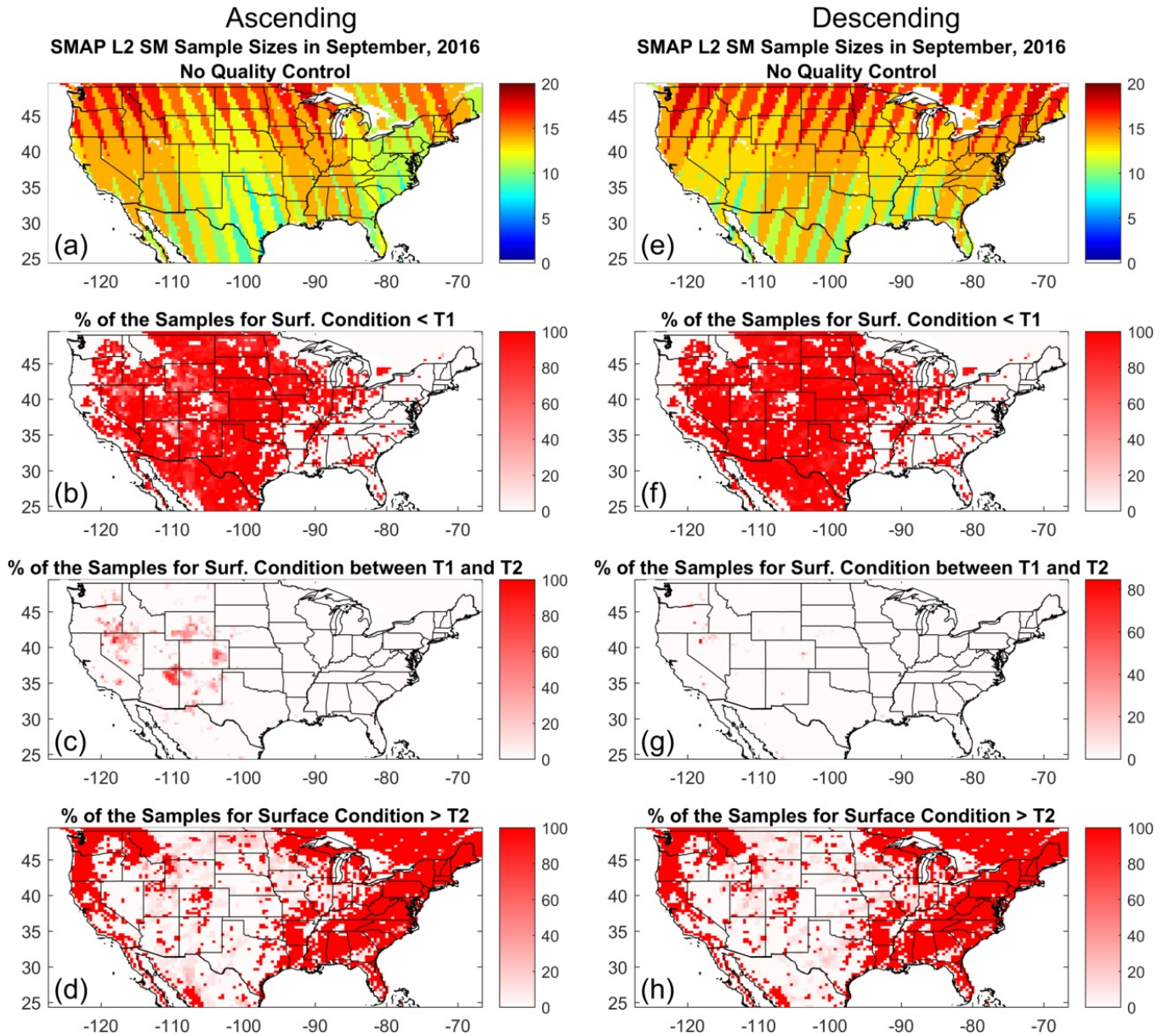


Figure 9: Same as Figure 1, except in September 2016.

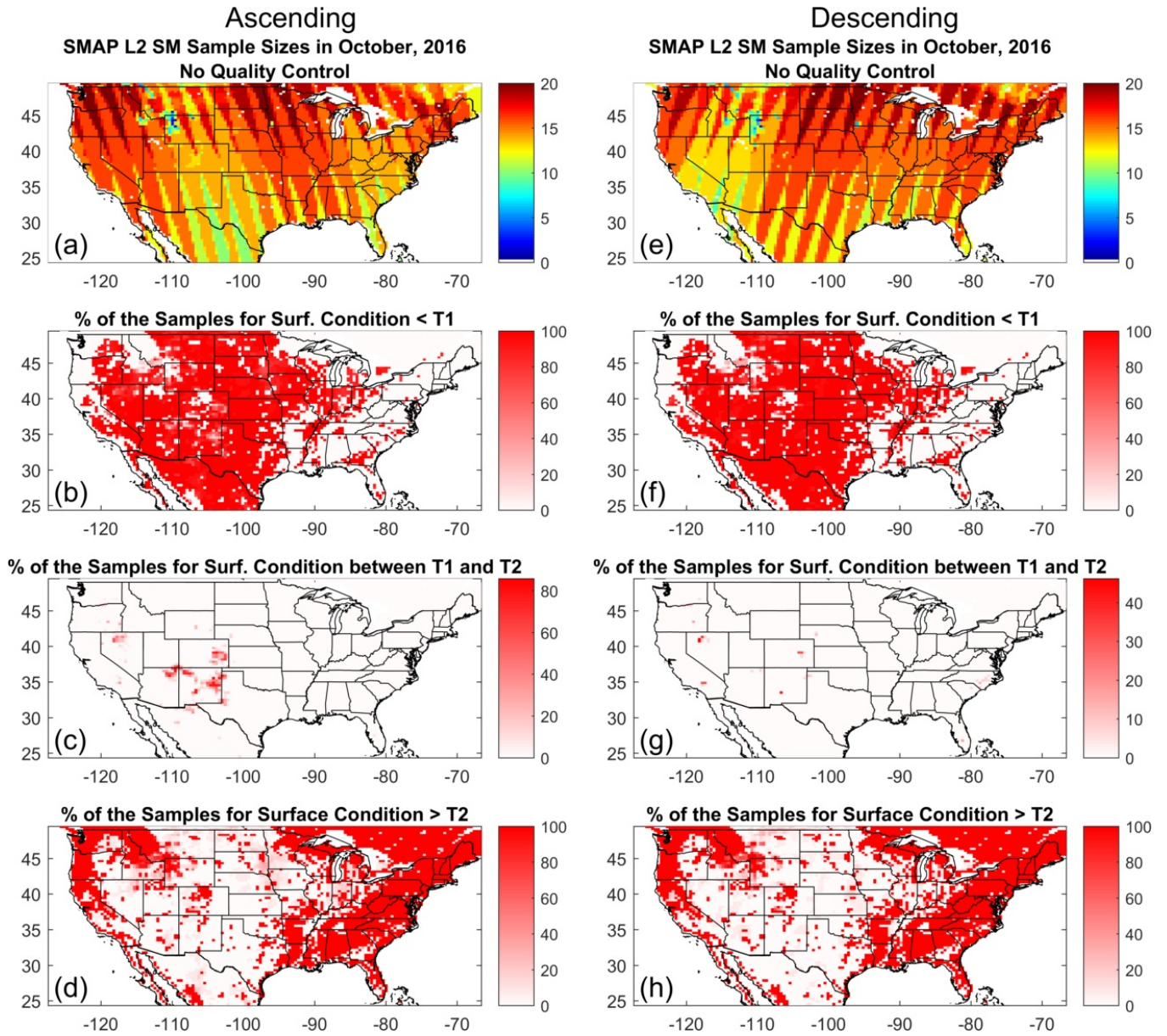


Figure 10: Same as Figure 1, except in October 2016.

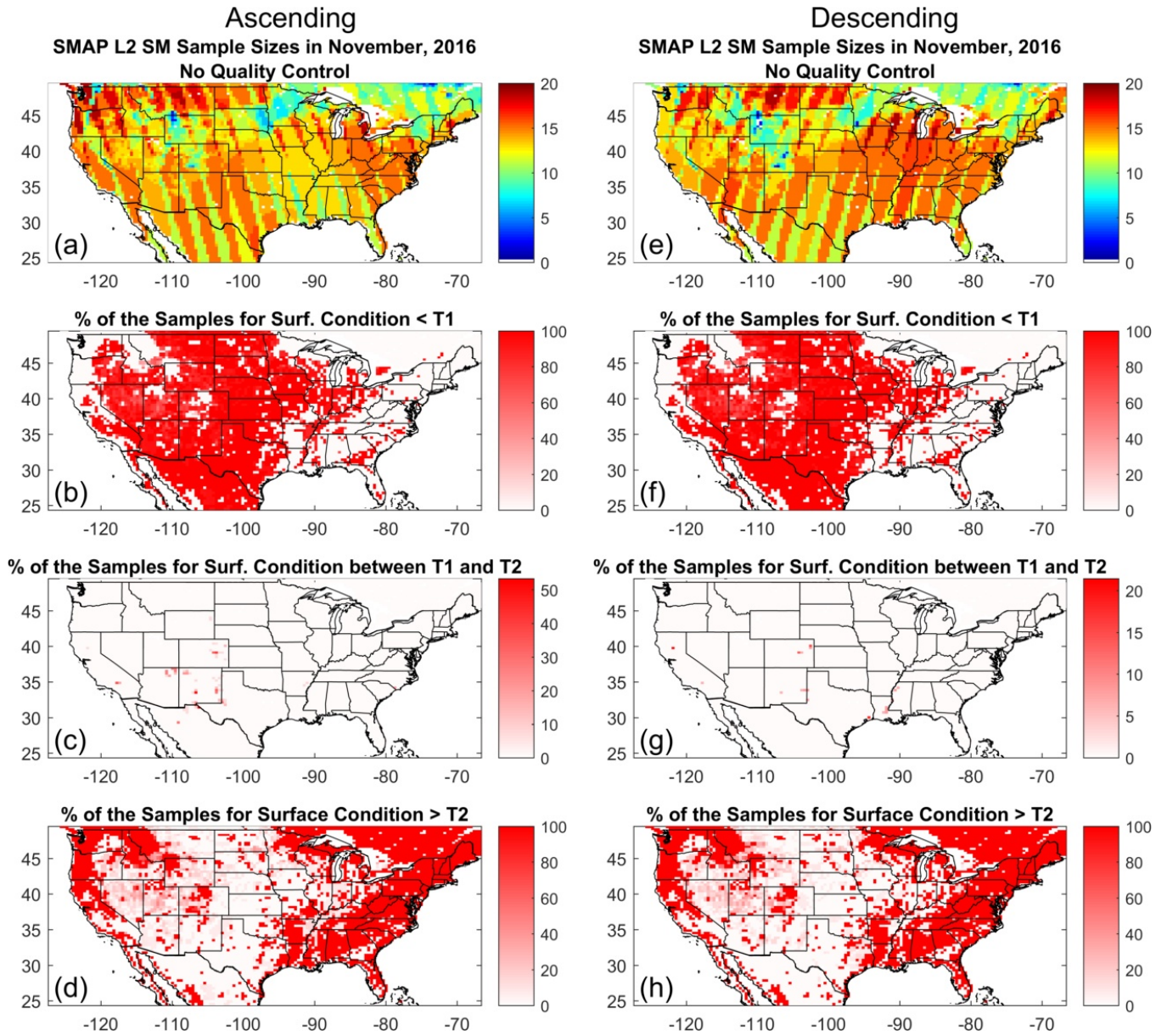


Figure 11: Same as Figure 1, except in November 2016.

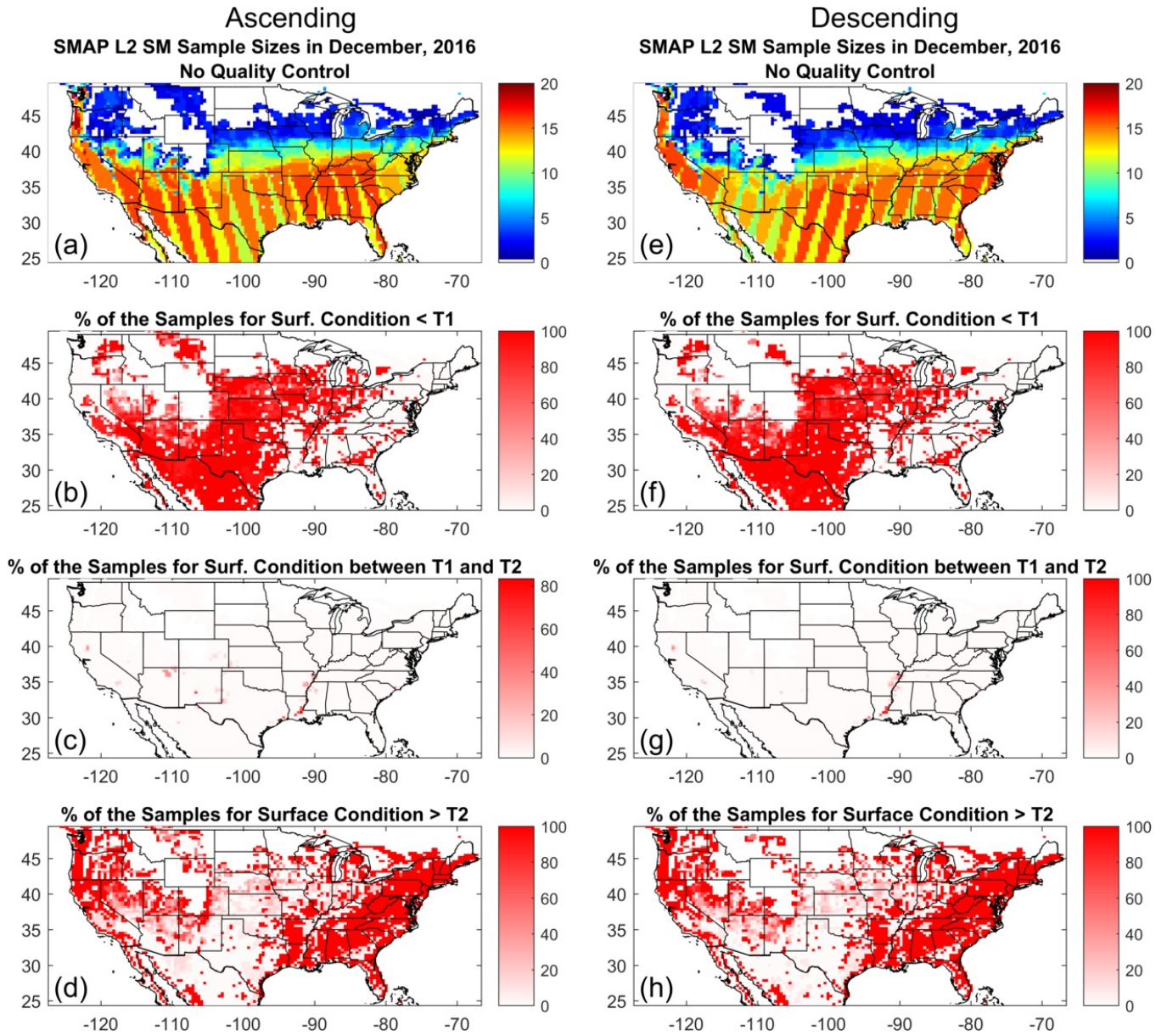


Figure 12: Same as Figure 1, except in December 2016.